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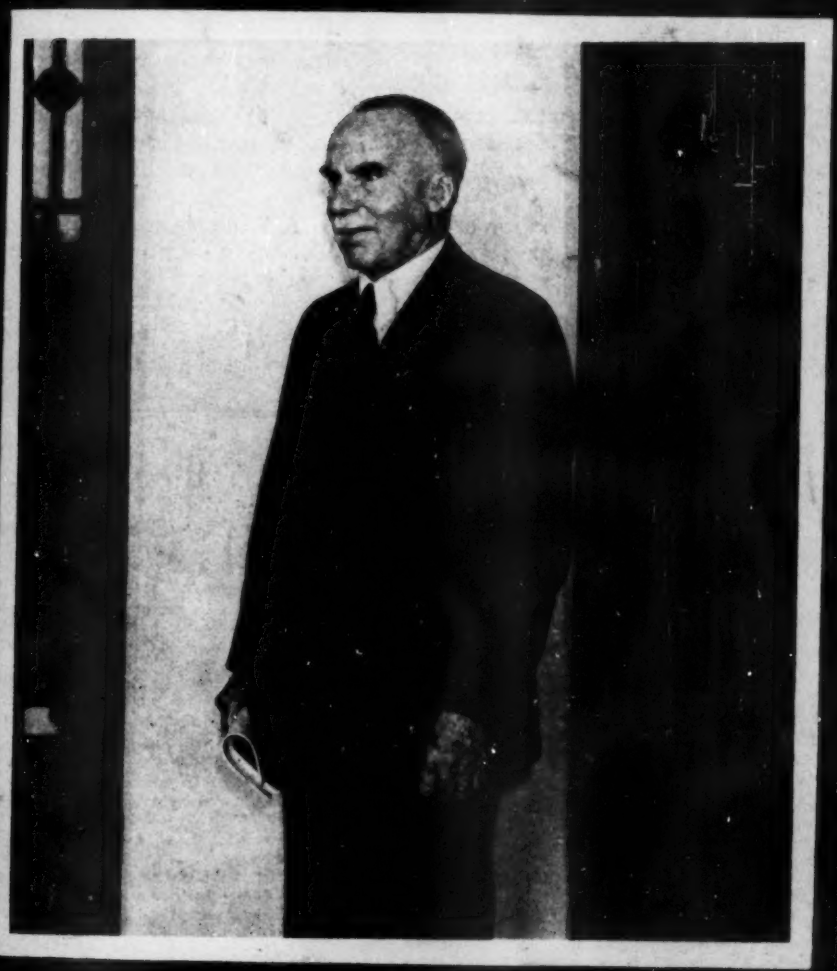
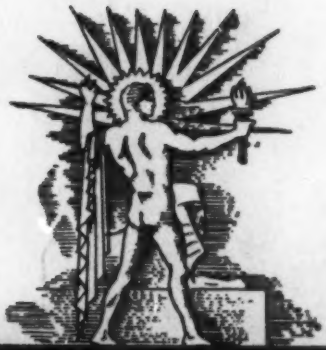
MAY 6_ 1935

# SCIENCE NEWS LETTER



THE WEEKLY SUMMARY OF CURRENT SCIENCE•





MAY 4, 1935

## Honored By Scientists

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A SCIENCE SERVICE PUBLICATION

# SCIENCE NEWS LETTER

*VOL. XXVII* *No. 734*

The Weekly Summary of Current Science

*Published Every Saturday by*

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*Edited by* WATSON DAVIS

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# DO YOU KNOW?

American sailors at sea can now obtain professional dental advice via radio for serious toothache troubles or jaw injuries, by a new arrangement of a New York dental society.

The London Zoo's baby chimpanzee born February 15, is the first chimpanzee born at the zoo, and is proving the greatest attraction there in many years.

Funeral wreaths found in tombs of ancient Egypt are made of such flowers as poppies, narcissus, mignonette, ivy, cornflowers, lilies, and laurel.

Germany's Graf Zeppelin has flown across the Atlantic 62 times without serious mishap.

The largest elephant tusks on record brought almost $5,000 for the pair, when sold in Zanzibar.

Probably no German town of the middle ages had more than 25,000 inhabitants.

Since 1910, over 3,000 minor planets have been discovered by astronomers.

The pink bollworm, serious cotton pest, has infested new cotton-growing areas by travelling in its moth stage amazingly long distances through the air.

The South African plant called elephant's foot gets its name from the big stem, which may grow to be over three yards around and almost three feet high.

Government tests indicate that the Dutch elm disease may develop from spores carried by the wind to a fresh wound in an elm.

The quarries of King Solomon, under Jerusalem, are sometimes called "cotton caves" because the stone is so white.

British scientists are planning a survey of the racial history and physical composition of the British population.

A South African zoo has three baby lion-tigers, offspring of a father lion and mother tiger.

Fully half of the United States' honey crop is produced by amateur beekeepers.

## WITH THE SCIENCES THIS WEEK

*Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the articles.*

ANTHROPOLOGY

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ARCHAEOLOGY

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CHEMISTRY

# Element 93 Discovery Is Now Confirmed by American

## Two Super-Heavy Elements Lie Beyond the 92 Known To Science and Shown in Familiar Periodic Table

TWO super-heavy chemical elements creatable by science in the laboratory almost certainly lie beyond the confines of the 92 elements in the familiar periodic table, Dr. Aristid V. Grosse, physical chemist of the University of Chicago, indicated in an interview with a Science Service representative while present at the meeting of the American Philosophical Society in Philadelphia.

First definite proof for the existence of these two new elements has just been reported from Italy and Germany, Dr. Grosse said, and convinces him that the earlier preliminary claims for the discovery of element 93, in particular, can now be accepted as fact. (*SNL, June* 16, 1934, *and June* 23, 1934. *See also Prof. Fermi's prediction, SNL, Oct.* 20, 1934) Dr. Grosse had previously contended that Prof. Enrico Fermi in claiming the production of element 93 was really working with element 91—protactinium—already isolated by Dr. Grosse. (*SNL, Aug.* 18, 1934)

Revision of tests by Prof. Fermi along unchallengable lines settles the controversy, Dr. Grosse said. It developed that Prof. Fermi's first reports were in error. Dr. Grosse's challenging of this work led to the new tests which substantiate the early claims previously based on erroneous experiments.

Moreover, Dr. Grosse indicated, Drs. O. Hahn and L. Meitner in the Kaiser Wilhelm Institute, Berlin, have independently substantiated the Italian work and the way now seems clear for the creation of at least two and perhaps a whole series of artificially-created elements previously unknown to man.

The super-heavy elements are created by bombarding the heaviest naturally-occurring element, uranium, with neutrons. The neutrons pierce the cores of the uranium, stick there and thus increase the weights of the atoms.

Although neither elements 93 nor 94 have been isolated in pure form, Dr. Grosse, from a study of the chemical properties of the known atoms, predicts that they will have characteristics associated with the two rare metals, rhenium and osmium. This means they will be extremely hard and heavy metals.

Rhenium has only recently been applied to industry with the discovery of how to electroplate it on to other metals. Highly resistant to sulphuric acid, rhenium is expected to find wide use in lining tank cars and other containers for shipping this acid which formerly was transported in glass bottles.

Protactinium, which Dr. Grosse described in a report to the Society, is rarer than radium. It is obtained from five tons of residue ore from the radium factory at Joachimsthal, Czechoslovakia, being worked over in laboratories at Chicago. From two tons of this ore one-half milligram of pure protactinium has been obtained. So far the concentration necessary, Dr. Grosse said, was equivalent to saving only one part out of four million of the original material.

Like radium, protactinium gives off alpha, beta and gamma rays, but the possible therapeutic value of the rays is yet untested. Only recently has a sufficient quantity been available to allow its distribution to medical laboratories.

The alpha rays or nuclei of helium atoms which protactinium shoots off in disintegrating have energies equal to 2,540,000 electron volts—higher than those of radium. And it is much more lasting than radium, for its life period is 46,000 years where radium is only 2,500 years.

*Science News Letter, May 4, 1935*

ARCHAEOLOGY

## Oldest Americans Trailed By Tools Found on Campus

BROKEN stone tools, discovered through a chance bit of digging on a college campus at Fairbanks, Alaska, may convince still skeptical archaeologists that America is no recently discovered New World, but has been inhabited since the Old Stone Age.

The stone tools unearthed in Alaska are pronounced at the American Museum of Natural History, in New York City: "The first clear archaeological evidence of early migration to the American continent."

American antiquity is demonstrated to archaeological satisfaction by discovery that the Alaskan tools match Asiatic tools of the Gobi Desert's Paleolithic or Old Stone Age. The matched tools point a trail of ancient men from Asia to America, and indicate that the immigrants moving across Bering Strait were people not yet advanced out of Asia's Old Stone Age. (*Turn to Page* 284)


**CLASSES IN THE AIR**

***Aeronautics is taught in the air as well as on the ground at Purdue University's airport. Purdue is said to be the only college to have an airport in connection with its aeronautical courses, which are headed by Capt. G. W. Haskins. The flying Purdue students got an unexpected lesson in stratosphere flying when Wiley Post made his unexpected landing of the Winnie Mae at this airport.***

Dr. N. C. Nelson, curator of prehistoric archaeology at the American Museum, announced this new evidence for early Americans in an initialed note in the Museum's publication, *Natural History*. (*May-June*) Examining the Alaskan tools he found two kinds, consisting of small semi-conical flint cores and small endscrapers to be "identical in several respects with thousands of specimens found in the Gobi Desert by the Central Asiatic Expedition in 1925-1928."

"The specimens," continued Dr. Nelson, "furnish the first clear archaeological evidence we have of early migration to the American continent, apparently during the final or Azilian-Tardenoisian stage of the Paleolithic culture horizon possibly 7,000 to 10,000 B.C."

First of the Alaskan stone tools came to light when a posthole was dug on the campus of the Alaska Agricultural College and School of Mines at Fairbanks, in 1933. Stimulated by this discovery relating to prehistoric man, Jack Dorsch, working under direction of Dr. C. E. Bunnel, College president, dug a trench across the campus last summer. His excavations revealed about 400 hammerstones, projectile points, rejected flakes, cores, and endscrapers, most of the ancient tools being fragmentary.

*Science News Letter, May 4, 1935*

GENERAL SCIENCE

# Dr. Frank R. Lillie Heads Both Academy and N. R. C.

## Science Aid to Government and People Pledged Anew By Biologist of Chicago and Woods Hole

**See Front Cover**

DOCTOR Frank R. Lillie was elected president of the National Academy of Sciences for a four-year term, an office considered the highest within the gift of American science. He is Canadian born and has been serving both as dean of the division of biological sciences at the University of Chicago and as president of the Woods Hole, Mass., Marine Biological Laboratory.

Dr. Lillie succeeds Dr. W. W. Campbell, astronomer and former president of the University of California.

Dr. Lillie was also elected to the chairmanship of the National Research Council. He is thus placed in a key position as a leader of American science. Heretofore the two positions have not been held by the same person and a coordination of the scientific activities of the academy and the council is expected to result from Dr. Lillie's election to both positions.

Science is pledged anew to serve the nation in a statement made by Dr. Lillie:

"The National Academy of Sciences established by President Lincoln under Congressional charter in 1863 stands for the world-wide advancement and promotion of science and for the application of its results to the industrial, social, educational and governmental activities of the American people. It knows no politics and it is at the service of the elected representatives of the people. Through its National Research Council and the Science Advisory Board it maintains relations with all national scientific organizations and endeavors to focus the resources of their knowledge upon the problems that confront us."

The front cover of this week's SCIENCE NEWS LETTER carries the picture of Dr. Lillie standing at the entrance of the National Academy building.

Youth was served in the elections of new members of the National Academy of Sciences. Outstanding on the list of new Academicians is Dr. Harold C. Urey, age 42 and last year's Nobel prizeman in chemistry for his discovery of "heavy water." He is professor of chemistry at Columbia University.

Even younger than Dr. Urey is a Harvard physicist, Dr. J. H. Van Vleck, one of the "boys" who has turned classic science upside down with brilliant new investigations in quantum mechanics. Dr. Van Vleck just escaped being a child of the present century; he was born in 1899.

Of the fourteen men elected, eight are under fifty years of age. Arranged by decades, two of the new members were born in the late 1860's, two during the 70's, eight in the 80's and two in the 90's.

So far as professional type is concerned, there was an even division between the so-called exact sciences of the physics-chemistry group and natural sciences, with seven of the fourteen new members falling in either division.

The full list of new members follows: Dr. N. L. Bowen, Carnegie Institution of Washington, geologist; Dr. C. M. Child, University of Chicago, zoologist; Dr. G. E. Coghill, Wistar Institute, Philadelphia, chemist; Dr. James Ewing, Memorial Hospital, New York City, pathologist; Dr. M. L. Fernald, Gray Herbarium, Cambridge, Mass., botanist; Dr. Harvey Fletcher, Bell Telephone Laboratories, New York City, physicist; Dr. Ross Aiken Gortner, University of Minnesota, chemist; Dr. E. A. Hooten, Harvard University, anthropologist; Dr. J. C. Hunsaker, Massachusetts Institute of Technology, aerodynamist; Dr. Walter S. Hunter, Clark University, psychologist; Dr. Dunham Jackson, University of Minnesota, mathematician; Dr. Chester R. Longwell, Yale University, geologist; Dr. H. C. Urey, Columbia University, chemist; Dr. J. H. Van Vleck, Harvard University, physicist.

New Foreign Associates of the Academy are: Dr. J. S. Haldane, physiologist of Oxford University, England, and Dr. Jules Bordet, bacteriologist and director of Pasteur Institute, Brussels, Belgium.

Science's aid in the present war on crime was recognized by the National Academy in the award of its Public Welfare medal to August Vollmer, University of California expert in police administration and former Berkeley police chief. Illness prevented Prof. Vollmer's attendance at the presentation.

Dr. James P. Chapin of the American Museum of Natural History received the Daniel Giraud Elliot medal for his researches on Belgian Congo birds. In their absence, the Henry Draper medal for astronomy was conferred upon Dr. J. S. Plaskett, director of Canada's Dominion Astrophysical Observatory at Victoria, and the famous Agassiz medal for oceanography was awarded Prof. Haakon Rasberg Gran of Oslo.

*Science News Letter, May 4, 1935*

## Science Preserves an Ideal

**"It is a matter for thankfulness that among the many sources of world distrust and jealousies, science preserves an ideal of purity, truthfulness and mutual good will toward all nations. Not only do cooperative international scientific projects flourish, but the publications of scientists are received at face value in all lands, even though they be politically at variance."—President Franklin D. Roosevelt in a letter of welcome to the National Academy of Sciences.**

PSYCHOLOGY

# Monkey Swinging on Trapeze Aids in Study of Brain

## Infant Animal Who Lost Motor Area of Cortex Is Able to Run, Jump and Play As Though Normal

A YOUNG monkey swinging nimbly on the flying trapeze is demonstrating to scientists at Yale University that parts of the brain are not nearly so specialized in their functioning as has been supposed.

While the monkey was an infant, an injury deprived him of the use of that part of the outer layer of his brain which is known to scientists as the motor area. Despite this, the baby monkey developed normally. He runs about and plays, jumps, climbs, and swings from the trapeze.

This monkey on the flying trapeze is contributing to a study of the brain functioning of apes and monkeys by Drs. Carlyle F. Jacobsen and George M. Haslerud, who are experimenting with these animals because of their close similarities to man.

The young monkey is proving that the normal function of this part of the brain can be taken over in the young animal by other parts of the brain and nervous system. In the adult, no amount of re-education has ever brought about such a transfer of functions.

Not all parts of the brain can hand over their work to other agencies in this fashion, it was found. The association area that enables you to put two and two together to make four and makes it possible for you to hold facts in mind while you solve problems is a part of the brain that seems to have no understudy. An injury to this part of the brain in an adult causes a complete loss of memory for recent events and makes the individual unable to remember what day of the week it is or where he laid down his spectacles.

Apes and monkeys who do not have the use of the association area of the brain may watch an experimenter putting a tempting morsel of food under a cup but unless they are allowed to secure the treat within two seconds they will have already forgotten where it was hidden.

Even though injury occurs to the animal early in infancy the functions of the association area are not recovered through action of other parts of the brain or nervous system. The loss appears to be complete.

*Science News Letter, May 4, 1935*

"INDIAN" FROM TIBET

***The famous profile of the buffalo nickel Indian (inset) matches feature for feature this native type discovered in far-away Tibet by Gordon T. Bowles, Harvard University anthropologist.***

ANTHROPOLOGY

# Find Profiles in Tibet Like Buffalo Nickel Indian

A PEOPLE bearing striking similarity to the American Indian of the Western Plains has been discovered in Tibet by Gorden T. Bowles, assistant in anthropology at Harvard University, who has completed the first systematic anthropological measurements of Tibetans.

Other equally significant and promising clues to the mystery of the origin of some of the great population types of the world have also been uncovered.

Characteristic convex noses, projecting cheek bones, thin lips covering fairly prominent teeth and skin tinted copper-red mark the Tibetan-American Indians found. Some representatives of this people have profiles very similar to that of the Indian on the familiar buffalo nickel.

This people forms about a tenth of the population of southeastern Tibet and it is Mr. Bowles' theory that it originated with a prehistoric invasion of European peoples into Mongolia and the ensuing mixture of fundamentally white and Mongoloid blood.

Part of this resulting mixture drifted down into Tibet and became isolated there where they are today, he believes. Others spread eastward and northward through northeastern Siberia, eventually crossing Bering Strait, and swept down onto the American plains, the founders of our American Indians.

Mr. Bowles' studies were conducted during a two-year stay in Tibet, sponsored by the Harvard-Yenching Institute and the University Museum of the University of Pennsylvania. He made thorough anthropological measurements of peoples living in the disputed border country between southwestern China and southeastern Tibet.

So successful were his investigations toward unraveling the origin of some of the world's population types that Harvard University has again sent Mr. Bowles and his wife on a quest for further data. They are to seek the beginnings of the Tibeto-Burman people between Tibet and the southern Himalayan foothills.

The people of this area, isolated in the deep valleys between towering and rugged mountain chains, have retained their physical characteristics for centuries. Invaders swarming over the region have also left representatives whose physical characteristics are preserved because the lay of the land served to keep groups more or less apart.

Some other peoples, however, left permanent marks there in their prehistoric migrations and Mr. Bowles regards the area as one of the few key regions likely to hold answers to the great questions of racial dispersion throughout the world.

*Science News Letter, May 4, 1935*

PHYSICS

# Scientists Reach Agreement On Cosmic Ray Problems

## Physicists Concur in Opinion That Radiation Consists Of Both Light Photons and High Speed Particles

THE MUCH publicized cosmic rays, ever bombarding the earth, and causes of many a scientific difference of opinion, are passing from the debatable stage to one of agreement among the various investigators in the field.

At the meeting of the American Philosophical Society just concluded at Philadelphia, the three foremost American scientists working on cosmic rays presented reports which show agreement on most of the experimental findings. Dr. Robert A. Millikan, Nobel Laureate from California Institute of Technology, Dr. Arthur H. Compton, also Nobel Prize winner, from the University of Chicago, and Dr. W. F. G. Swann, director of the Bartol Research Foundation of the Franklin Institute of Philadelphia, all agree that much of the incoming cosmic radiation consists of electrified particles.

They differ, however, in the exact percentage of corpuscular rays among the incoming primary radiation. Dr. Millikan says from 15 to 20 per cent. may be so classified; Dr. Compton reported that all but a fraction of one per cent. are corpuscular; while Dr. Swann adheres to the intermediate ground with an estimate of at least 31 per cent.

All three men agree on the difficulty of detecting the original primary radiation and agree, too, that what affects the measuring instruments are secondary rays predominantly, created by the shattering of air atoms and molecules as the primaries strike them.

The situation is much more difficult to observe than it would be to take observations on a flying shell by measuring the range of bricks knocked out of a building which the shell might hit.

Key to the whole mystery, of whether the rays are completely corpuscular or if they are a mixture of particles plus the light packets known as photons, may reside in the nature of the way these two different and distinct types of rays will act on atoms.

As Dr. Swann expresses the situation: "Cosmic rays, if photons, would liberate energy along their path like bullets going through a forest, occasionally hitting a tree, and giving up almost all their energy in one burst at impact. If the rays are particles, however, they will act like bullets going through cheese and would give up their energy gradually and in small amounts all along their path."

These two types of energy transfer yield different curves as the rays are absorbed in the earth's atmosphere. All three scientists agree that Dr. Millikan's theory of the photon nature of the rays would produce such a known curve most simply. And yet there is the conceded fact that many of the rays are particles.

Taking the conservative stand, Dr. Millikan feels that until proved otherwise photons must still be regarded as present in the incoming primary cosmic radiation. Dr. Compton goes the whole way and says the initial rays are all particle in nature and even gives the kind they are: alpha particles—cores of helium atoms—, electrons, and protons—the cores of hydrogen atoms. Dr. Swann is working to provide some explanation of hom cosmic rays, all particle in nature, can yield experimental curves like those observed and more easily explained by photons. At the recent meeting he presented such a hypothesis. The explanation of cosmic rays seems nearer a solution than ever before. Another year may solve the mystery.

*Science News Letter, May 4, 1935*

MEDICINE

## Huge Blood Transfusions Now Given for Anemia

BLOOD transfusions which break the world's record both for amount of blood given to the patients and the length of time consumed in the process are reported by Drs. H. L. Marriott and A. Kekwick of Middlesex Hospital, London.

A total of over fifteen gallons of citrated blood was given by these physicians to seventeen patients. The customary amount for a single transfusion is a little over a pint of blood. One of the patients in the group at Middlesex Hospital received over five quarts of blood collected from ten donors plus almost a quart of citrate solution, used to keep the blood from clotting. The smallest amount given in one transfusion was over two quarts of blood plus about a pint of citrate solution.

The blood was allowed to run into the patient's vein very slowly, a drop at a time, by what physicians term the continuous drip method. The total time for all seventeen transfusions was 5371½ hours, which aggregates more than 26 days.

The transfusions proceeded without a technical hitch, the Middlesex physicians state. (*Lancet*)

The enormous quantities of blood used were obtained from one hundred donors, mostly friends and relatives of the patients. The donors were bled in pairs at 8 a. m. and 8 p. m. The amounts taken from each varied from about half a pint to nearly a quart of blood.

The method is essentially one of slow, controlled transfusions lasting from many hours to several days and is designed for use in cases of anemia resulting from prolonged illness or from large losses of blood following surgical operations.

*Science News Letter, May 4, 1935*

PSYCHOLOGY

## East Less Emotional Than West In Trying Situation

PSYCHOLOGISTS have at last tested the proverbial calmness of Orientals —and found it the real thing.

Stolid Orientals not only appear calmer than Americans, they are really less emotional within, results of a test reported to the National Academy of Sciences indicate. Japanese in the test proved no less calm than Chinese, to the surprise of the experimenting psychologists, Dr. George M. Stratton and Franklin M. Henry, of the University of California.

Dropping a hammer close to outstretched fingers, in place of William Tell's famous stunt of shooting an apple off a head, is the ingenious test devised by these psychologists for probing a racial difference. For subjects they used volunteer men students, 50 of whom were Caucasian and 100 Orientals, about evenly divided as Japanese and Chinese.

Familiar as the mechanical drop of the huge wooden hammer became, Dr. Stratton declared that, for himself, the loud sudden bang always caused him

to flinch anxiously when the "outrageous thing fell and struck so near me."

Seeking to measure the inner signs of emotion, Dr. Stratton hooked up his Eastern and Western subjects with apparatus to record the circulation and pressure of the blood, respiration, and electrical resistance of the skin, as well as the flinching of the hand.

Taken as individuals, the Orientals and Americans showed a wide range of reactions. But in general the Americans reacted more vigorously.

In withdrawing the hand from the hammer, Americans were more vigorous by 15 per cent. at least, and 75 per cent. at the greatest, than the Orientals. But between Japanese and Chinese, no significant difference was detected.

Finding that Chinese born in this country and brought up in a Western environment react in true Oriental fashion, if anything less emotionally than their China-born racial brothers, leads the psychologist to believe that the emotional difference is racial, and not due to environmental difference of the Orient and the West.

*Science News Letter, May 4, 1935*

CHEMISTRY

# "Laughing Gas" Whipped Cream Spurts From Syphon

CHEMISTRY has discovered a new method of producing whipped cream by the use of "laughing gas" which makes the preparation of cream puffs and intricate pie-toppings a pleasure for the housewife. By the new process, cream can be inflated 450 per cent., which means a pint of cream can be turned into more than two quarts of smooth, foamy and delicious whipped cream.

When the new technique is put on the market, a container like an ordinary seltzer syphon will be delivered to the housewife's door ready for use, said G. Frederick Smith and C. A. Getz, chemists of the University of Illinois before the meeting of the American Chemical Society.

The whipped cream "syphon" can be stored in the icebox or placed on the table. The consumer merely pushes a button and releases cream in any desired amount.

Under the old method, which often as not resulted in failure as every housewife knows, air was beaten into cream of high butter fat content with a rotary whipper and much "elbow grease." If the cream had the right fat content, was sufficiently aged and had just the right temperature, whipped cream resulted in about twice the amount of the ordinary cream used, or an overrun of 100 per cent. as the dairy men call it.

In the new method, instead of whipping air bubbles into the cream an odorless, non-toxic and tasteless gas is injected into the cream in a container under high pressure. Nitrous oxide—the "laughing gas" of dentistry—is used at present, the scientists said. The whipped cream is completely harmless, they added.

Upon releasing the pressure by pushing a button, the gas expands instantly, "inflating" the cream up to 450 per cent.

The whipped cream containers come in pint size, weighing a pound when charged, and will be obtained like a seltzer bottle for the price of its contents plus a deposit on the bottle.

While the scientists prefer to use nitrous oxide, other gases which are soluble in cream at ordinary pressures to the extent of one volume of gas for each volume of cream can also be used. Nitrogen, oxygen, and air are useless.

*Science News Letter, May 4, 1935*

ASTRONOMY

# Dust Storms Never End On the Planet Venus

DUST storms sweeping the West should afford science one means of finding out more about the atmosphere surrounding Venus, "veiled planet."

This is the suggestion which Dr. V. M. Slipher, director of Lowell Observatory, Flagstaff, Arizona, will make to the U. S. Weather Bureau, it was disclosed before the meeting of the American Philosophical Society at Philadelphia.

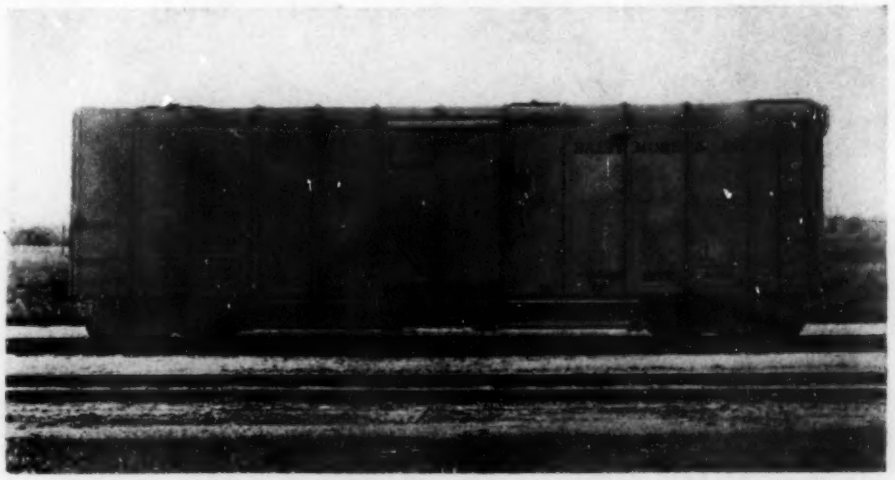
His plan for utilizing earth's dust storms for science would be to make airplane flights high above the dust clouds, and measure the upward reflection and scattering of sunlight on the dust layers which bring worry miles below.

Such information should be of value when applied to the planet Venus, which appears to have perpetual dust storms in its atmosphere. Venus is without moisture to lay such dust, which once stirred up floats continually high above the surface of the planet. That at least is the present hypothesis which Dr. Slipher would like to check with airplane dust-cloud measurements on earth.

Recent observations, he also told visiting scientists, show that the weather prediction for Mars now is "cloudy and warmer."

Mars is going through what is summer for its northern hemisphere, and such times are accompanied by an increase in cloudiness. Similar measurements made in 1920, he disclosed, showed comparable cloudiness.

*Science News Letter, May 4, 1935*



**COVERED WAGON, 1935**

***Light weight freight cars are the latest in American railroading. Without loss of strength and with great decrease in dead weight, the Baltimore and Ohio Railroad has just completed thirteen experimental freight cars embodying the newest engineering principles. Smoothing of the most angular exterior parts of the cars cuts wind resistance.***

CHEMISTRY—MEDICINE

## Manufacture Chemical That Causes One Kind of Cancer

FURTHER progress on the vital problem of what causes cancer is being made at Harvard University through the preparation of synthetic materials which, when applied to experimental animals, can cause cancer to occur.

Dr. Louis F. Fieser and his coworkers, M. Fieser, E. B. Hershberg, M. Newman and A. M. Seligman of Converse Memorial Laboratory revealed the cancer progress before the organic chemistry division of the American Chemical Society at its opening sessions.

The Harvard chemists have been able to make synthetically the cancer-causing coal tar product methylchloranthrene previously made only from bile acid of the body. Artificial manufacture of the substance will aid cancer research by making available quantities of the carcinogenic agent for animal experiments.

It is from such animal experimentation that science hopes to learn the particular pattern in the molecule that is able to start the malignant growth or cancer.

*Science News Letter, May 4, 1935*

PHYSICS

## Nature's Share-the-Wealth Program to Bring Chaos

NATURE has its own "share-the-wealth" program, which promises to run the world down to a final state of chaos, Dr. W. F. G. Swann warned the American Philosophical Society.

Huey Long's name was not mentioned as Dr. Swann, director of the Franklin Institute's Bartol Research Foundation, delivered the Penrose lecture, a memorial not to the famous Pennsylvania senator and political boss but to his geologist-brother who left a large bequest to the society.

Degradation of energy is the concept by which scientists designate the gradually running-down process of the universe. Hot bodies lose heat to colder bodies and it is the difference of heat which makes possible the operation of so many of man's machines.

"Nature is like human beings," he said. "Human beings permit sections of society to exist in different states of prosperity, but whenever she gets a chance in the form of a revolution, things so arrange themselves that the revolution reduces the disparity."

Prosperity for nature consists of the presence of heat without which men's intricate machines cannot operate, Dr. Swann said.

The final state of the "share-the-heat" program of nature may well result in the chaotic state where all things in the universe—like all men in the "share-the-wealth" program — would be equal. Equality of heat, Dr. Swann indicated, means equality of energy for all things. For man the result would be the collapse of civilization. Without differences of energy it would be impossible to boil water, run steam engines and perform the host of other commonplace acts on which civilization is built.

*Science News Letter, May 4, 1935*

ARCHAEOLOGY

## Thefts Lead Expedition To Discover Unknown Gods

FOLLOWING a trail of sculptures—presumably stolen—that led into the Syrian desert, archaeologists have discovered villages where shepherds 1700 years ago banqueted in honor of forgotten gods.

Ruins of no less than 22 holy places have been found in these villages north of Palmyra, said the expedition leader, Dr. D. Schlumberger, addressing the Berlin Archaeological Society. The desert expedition was undertaken by the Service of Antiquities in Beirut.

The largest holy place contained five rooms for the religious banquets traditional in Syria. The room foundations were especially built to hold the sofa-like beds on which the banqueters reclined. A stone vase such as held wine appeared in one room. The inscription on it, 256 A.D., dates the period when the villages flourished. Incense trays and altars were also found in the holy places.

Syrian and Arabian gods, some unknown to modern scholars, were worshipped here, the expedition has learned. Invocations to these gods are to be seen carved on bas reliefs, the stiff sculptural style of which recalls early Byzantine art. A number of the gods were portrayed riding horseback, suggesting to the archaeologists that the shepherds may have been breeders of the famous Palmyrene cavalry horses, with which Queen Zenobia won many a daring battle.

The mysterious sculptures brought out of this region in 1932, to astonish students of antiquities, are believed to have been stolen from the holy places in these shepherd villages.

*Science News Letter, May 4, 1935*

# IN SCIE

MEDICINE

## Eye Cataracts Linked to Way Body Uses Sugar

A NEW theory of the cause of cataracts in old people and in diabetics was presented by Dr. Helen S. Mitchell, of Massachusetts State College and Battle Creek College, Michigan, to the American Institute of Nutrition.

Dr. Mitchell found that she could produce cataract in rats within two weeks by feeding them a little more than a third of their ration as galactose. This is a sugar not found as such in nature but formed in the body from milk sugar. As a result of her studies, Dr. Mitchell believes that some cataracts in humans, particularly those occurring in diabetes, are due to faulty handling of sugar by the body.

The cataracts produced in her rats were the same kind as occur in diabetes and in old people. Dr. Mitchell emphasized that her work is only beginning and much more study is needed to solve the mystery of why cataracts form.

She called her work "merely opening the door to much more investigation." Cataracts, she explained, are like "lumps of egg white cooked." They are opaque and cannot be cleared any more than egg white can be uncooked.

*Science News Letter, May 4, 1935*

ANTHROPOLOGY

## Big Right Hand Does Not Mean Right-Handedness

THE WELL known facts that 75 or 80 per cent. of us have right hands larger than our left, and that about the same proportion of people are right-handed, have no essential connection with each other, Richard H. Post of Smith College told the American Association of Physical Anthropologists. The common assumption that our right hands are bigger because we use them more he proved by statistical studies on a company of soldiers to be unsupported by fact. Plenty of "southpaws" still had bigger rights than lefts, and also longer right than left arms.

*Science News Letter, May 4, 1935*

# EE FIELDS

ASTRONOMY

## Superstratosphere Winds Blow at 200 Miles an Hour

SUPERSTRATOSPHERE winds blow at 200 miles an hour. A fiery visitor from outer space, flashing into earth's upper atmosphere, made possible the measurements of these winds at the high levels where transoceanic planes should some day fly. At the meeting of the American Philosophical Society, Dr. Charles P. Olivier, director of the Flower Astronomical Observatory of the University of Pennsylvania, told of his computations.

A giant fireball flared through the sky over Texas and Oklahoma in 1933, striking terror into the hearts of superstitious persons. More cool-headed and scientific-minded individuals took measurements, and Dr. Olivier has been busy with calculations based on them ever since.

As the fireball tore overhead, 18 miles up, its long train of smoke was left behind, and gradually broke into knots or clouds. The rate at which these left-behind clouds moved is a measure of the superstratospheric winds. They averaged 200 miles an hour.

*Science News Letter, May 4, 1935*

ANTHROPOLOGY

## Color Cameras to Record Human Eyes for Science

BY HAVING color cameras look into human eyes, Harvard anthropologists are perfecting a new weapon for discovering the mechanics of heredity in human eye characteristics.

The problem of measuring eye pigmentation and pattern by use of color photography was initiated by Dr. Laurence D. Redway, formerly research associate at the Peabody Museum at Harvard, and it is now carried on by Edward Hertzberg, graduate student in anthropology.

Seeking information concerning man's physical makeup, science can make accurate measurements of many features including height, head length and facial width. Many other individual characteristics such as shape and slope of the forehead, hair color, and color and pattern of the eye, cannot yet be accurately determined.

Relatively crude estimates of these, all tinged with the troublesome personal equation, are most unsatisfactory and it is to develop new and accurate measurements that the present work has been undertaken.

Search for a satisfactory method of recording has begun. Next step will be to find a method of measuring and expressing the actual color values of the color photographic plate. With these problems solved, science has a powerful new weapon for a third step, that of learning the mechanics of heredity involved in the transmission of eye characteristics.

*Science News Letter, May 4, 1935*

MEDICINE

## Imbecility, Cretinism And Goiter Increasing

INCREASE throughout the nation of imbecility, deaf mutism and cretinism was reported by Dr. Arnold S. Jackson of Madison, Wis., to the American Association on Mental Deficiency.

Because goiter is a first step in the degenerative process of which cretinism, often accompanied by imbecility and deaf mutism, is the last, Dr. Jackson urged that every effort be made to prevent the further increase of goiter. As many as four-fifths of the girls and one-fifth of the boys living in the great goiter belt, which extends from Boston to Seattle, are afflicted with goiter, Dr. Jackson found in a nation-wide survey of the problem. Cretinism, resulting from this type of goiter, is more prevalent in the United States today than at any time in the nation's history. Efforts to prevent goiter, Dr. Jackson stated, have fallen off since the financial depression.

Cretinism is a thyroid gland disorder in which the U-shaped gland in the neck fails to secrete enough of its hormone. The body's fires burn more slowly than is normal, the patient grows fat and is sluggish in both mind and body. When the disease occurs early in childhood, the growth is stunted. Some of the dwarfs of present-day circus troupes and the dwarfs that were court favorites in past centuries were sufferers from this thyroid gland disorder. While goiter, of the kind commonly seen in Switzerland and in the Great Lakes Region of the United States, is a forerunner of this cretinism, not all such goiter cases result in the extreme condition.

*Science News Letter, May 4, 1935*

ARCHAEOLOGY

## Pharaoh Tried Curse As Political Method

A POLITICAL device that worked in Egypt, over 3,200 years ago, was to put a curse on officials who got "out of step."

How the Pharaoh Seti the First used a curse to insure that his plans would be carried out by the next administration was told by Dr. George S. Duncan, Egyptologist of the American University, before the Anthropological Society of Washington.

If future kings on Egypt's throne should dare to upset his work by a new deal, dire consequences might be expected, prophesied Seti, writing the threat on a temple wall for every one to read:

"The gods will become red like the flame of a brazier to consume their flesh, because they have not heard or listened to me. The gods will annihilate those who have violated my intentions."

The oldest peace treaty between two great nations also carried a curse, Dr. Duncan pointed out, and the Hittites and Egyptians who signed the compact in the thirteenth century B. C. kept it.

The Egyptian version in the treaty, in the words of Ramses the Second, warned the Hittite that failure of the treaty would mean "the thousand gods of the Egyptians will destroy his house, his country, and his servants."

Dr. Duncan traced the history of curses, as revealed by inscriptions, through the ancient world, showing that curses were regarded as real, and powerful as poison. Not only Egypt, but Babylonia and Palestine were ridden by the fear of prophetic evils that could be pronounced.

*Science News Letter, May 4, 1935*

SURGERY

## Russian Surgeon Replaces Lost Finger With Toe

TRANSPLANTATION of a toe to replace a forefinger lost in an accident was demonstrated by Prof. M. I. Kuslik of the Vreden Traumatological Institute at the meeting of the Leningrad Surgeons' Society. The patient can now bend his forefinger, which used to be the second toe on his foot, at will. Prof. Kuslik followed the transplantation technic devised by Prof. Vreden which has been successfully used in three similar cases.

*Science News Letter, May 4, 1935*

PHYSIOLOGY

# Fireman Save My Child!

## A Serious Medical Drama of Blue Babies Whose False Start in Life Is Corrected By a Common Gas

By WATSON DAVIS

THIS is a story of babies, blue babies babies who did not let out those first, shrill cries so welcome to doctors, nurses, and mothers exhausted with pain of childbirth. It has to do with clanging fire engines. It contains those chemical symbols $CO_2$ and $O_2$. Through it walks with energy and tenacity a first citizen of Yale and the realm of physiology, Yandell Henderson, professor and fighter. The Henderson who told the Congress to make the alcohol limit of waning prohibition's beer, the famous 3.2 per cent. —but that is of course another story. But most of all this is a tale of babies who lived and babies yet unborn who might otherwise have died, but now will live.

They will live because this energetic professor found a way to make them draw those vital first gasping breaths which fill their lungs. The babies—one out of every hundred—who fail to start breathing when they are born, and thousands of grown-up persons who have been drowned, who have suffered carbon monoxide gas poisoning, electric shock, or the after-effects of anesthesia will live because this professor, disregarding scientific theory sticking to the facts he discovered, has been telling physicians all over the country that it takes carbon dioxide with oxygen to start breathing.

### When Breath Fails

How do we breathe? This may seem a silly question, answerable: Through our noses. With our lungs. Quite right, of course. But more fundamentally, oxygen in exchange for carbon dioxide is soaked up by the blood that courses through the lungs. Breathing is quite automatic most of the time but when it fails to start at birth or when drowning, electric shock, carbon monoxide poisoning, anesthetic after effects, mountain sickness, aviators' collapse, lung irritating gases or pneumonia stops the service of oxygen to the blood, asphyxia,—suffocation to you—results. This is very serious, a first step toward death. Action, prompt and proper, is needed.

"The first quarter of an hour after birth," Prof. Henderson declares, "is the most dangerous period of life. Its mortality is as great as that of any subsequent month. No single discovery of medical science or improvement in practice could do more to save lives than would measures to avoid the losses that now occur within a few minutes after birth."

"Crude, ineffective and reprehensible is the treatment which ignorance and immemorial custom tolerate and even recommend for the non-breathing newborn child," referring to plungings into cold water or vigorous spankings.

More lives could be saved by giving new-born babies a carbon dioxide-oxygen mixture to stimulate their first breath than by the elimination of some of the diseases of infancy and childhood, such as infantile paralysis, Prof. Henderson estimates.

### A Hazard For All

Getting down to figures, he says that this measure would "make a difference of one life in a hundred—and it must be kept in mind that birth is a hazard through which all must pass."

"The normal baby starts to breathe under essentially the same stimulus that causes an adult to breathe again after holding his breath," Prof. Henderson explains.

You know what happens to your own breathing when you get under a cold shower or when some playful friend throws cold water over you literally, or when a rush of cold air suddenly strikes you. You catch your breath. The stimulus of the sudden cold against your skin makes you draw in a deep, prolonged breath or even repeated ones.

When the new born baby meets the cold world for the first time the same thing happens to him and in this way his lungs are at least partially expanded. So long as his lungs are unexpanded, they send no impulses over the nerves to the respiratory center, but as soon as baby's lungs are even partially expanded they send messages over certain nerves that call forth the reflexes which determine the alternation of inspiration and expiration in normal breathing.

But the collapsed state of the baby's lungs at birth is not so quickly overcome. Even in wholly normal babies the lungs are not fully expanded for hours, days or even longer. There is danger in this.

If parts of the lungs stay unexpanded, conditions favorable for lung infections are provided. Unrecognized pneumonia resulting from this condition is a far more frequent cause of death during the first weeks of life than has been realized. One medical scientist, investigating a series of deaths among the new-born, found that nearly one-fourth of them had pneumonia.

### Make Him Cry

To avoid such lung infections the textbooks recommended making the baby cry —by the methods Prof. Henderson terms "reprehensible." Much better and more effective, he maintains, is starting the baby's breathing by nature's own stimulus—specifically by inhalations of five to seven parts of carbon dioxide in a hundred parts of oxygen.

Babies, adults, children, cats and dogs, all breathe in response to the same stimulus and the same mechanism. And the trigger that sets off and maintains the breathing is the carbon dioxide that is brought to the brain's respiratory center by the blood. That is Prof. Henderson's contention.

Oxygen keeps the respiratory center in good condition and allows it and the rest of the body to produce the waste carbon dioxide. But give the body ample oxygen to burn and yet it might not get the signal to do so. The carbon dioxide is thus not an enemy but an ally of oxygen that paradoxically issues the orders that start breathing to draw in the oxygen. An increase of the carbon dioxide in the blood, as Prof. Henderson sees it, is the only stimulus that will restore normal respiration.

It may be technical and some may not understand it. As usual the facts are much simpler than the theory—or theories.

The widely accepted theory of what happens inside when breathing stops is that the waste carbon dioxide gets the upper hand, fills the blood and muscles and produces a state generally called "acidosis" because it is considered to be intoxication by carbonic acid.

Prof. Henderson shocked other physiologists by arguing that this theory is wrong. He recommended, with experiments to back up his advice, that to treat asphyxia, lungs should be fed not oxygen alone, but oxygen mixed with 5 to 10 parts per hundred of carbon dioxide—the very stuff that others assumed caused the trouble. There were heated arguments at scientific meetings.

### In Practice

Characteristically Prof. Henderson let the controversy continue in scientific halls and publications while he sent out a rescue call to the firemen of the nation. Through the manufacturers of rescue apparatus, the firemen were told to use the oxygen-carbon dioxide mixture in gas, drowning and other such cases. Not knowing the theories, they followed instructions without question. The "hook-and-ladder boys" did not realize they were refuting Prof. Henderson's professional opponents.

And happily for those saved and Prof. Henderson's idea, many people were snatched from that brink of death to which lack of breathing had taken them. Soon doctors, grasping at hope when life had seemingly fled, began to call the fire department rescue squad when their more orthodox methods had failed. A young interne in a Boston hospital, who had seen a "dead man" revive under the ministrations of fire department rescue apparatus, called the fire department when a new-born baby refused to take its first breath of life. The fire engine came too; but the baby lived.

One summer day, Prof. Henderson vacationing in Paris, reading news of the good old U. S. A., ran across a little Chicago item: "200 Babies Saved by Firemen." Not by carrying them down ladders from burning buildings, but by rushing inhalators to them. Here was a large scale demonstration of the usefulness of adding a little $CO_2$ to the $O_2$ of the inhalators. So Prof. Henderson pushed his radical idea harder than ever. He wrote careful, sedate articles in that weekly Bible of physicians, *the Journal of the American Medical Association,* urging them to use the new method;

"Unless one is burned alive, the tissues of one's body always die of asphyxia."

### Not In Lungs Alone

Breathing in its widest sense is not confined to your lungs alone. The lungs take in air and expel air, but there is another kind of breathing, known by the scientific term of respiration. This breathing means the exchange of oxygen and carbon dioxide and the production of energy. It is the most fundamental process of life and it goes on all over the body, not only in the lungs but in every other organ and in the minute cells of which your body and all its parts are made.

Any disturbance of the blood system, any change either by accident or disease of the cells of any tissue in the body almost inevitably involves a change of this particular kind of breathing process, either in a single organ or in the whole body. In cancer cells, for instance, an alteration of the cell respiration is found. And such alterations are found not only in carbon monoxide poisoning, in asphyxia of the newborn, or after prolonged anesthesia, but in the majority of all persons dying from disease. As death approaches, the tissues of the body are being suffocated.

### Oxygen Not Enough

After the tissues have begun to die from alteration in their breathing process, the process cannot be immediately reversed and the tissues revived by supplying oxygen, even in the most ample amounts.

"Life," says Prof. Henderson, "is not like a candle that on extinction can be immediately relighted. Recovery from asphyxia in an untreated patient is often extremely slow, indicating that certain conditions and processes far more complex than mere deficiency of oxygen have to be slowly and with difficulty reversed.

"If asphyxia of a little less than fatal intensity is prolonged, it may in rare cases render a man permanently an idiot as completely as if his cerebrum had been removed."

Oxygen is not a stimulant to breathing, Prof. Henderson kept on telling doctors who insisted on trying to start respiration with oxygen. The kind of combustion that goes on in the human body, whereby food is converted into energy, requires oxygen like any combustion process. But this combustion is not like a fire which burns more or less vigorously according to the supply of oxygen.

### A Misconception

Oxygen is an essential foodstuff. Without it the tissues cannot produce carbon dioxide, he explains. But asphyxia—suffocation, if you like—is not a condition of lack of oxygen and excess of carbon dioxide. This is the prevailing conception but it is a misconception, Prof. Henderson contends.

In asphyxia, usually, the blood and tissues contain low amounts of both oxygen and carbon dioxide. Thus the practical problem of getting the new-born baby to breathe is very nearly the same as that of resuscitating an adult who has been partially suffocated, either by gas poisoning or drowning or some similar accident. For both babies and adults,

**FOR DROWNING**

***Carbon dioxide and oxygen from the inhalator and artificial respiration by the Schafer method used together, as these girls are doing, will start breathing that has been stopped by drowning, electric shock or other accident. But if the inhalator isn't handy, start artificial respiration by the Schafer method immediately. Delay means death.***

it means giving a mixture of carbon dioxide with oxygen.

Every hospital should be equipped with an inhalator for the new-born, or better with an inhalator suitable for infants and adults as well, Prof. Henderson consequently advises. And for babies born at home, the physician need no longer depend on the hook-and-ladder boys. An inhalator small and light enough to carry in an overcoat pocket could easily be made, Prof. Henderson says.

You will notice that Prof. Henderson calls the apparatus an "inhalator." "Pulmotor" is a word he does not like. The original Pulmotor has been discredited by scientists and medical boards many times over but unfortunately its name still clings. He says:

"Because of this confusion of terms, the newspapers often report the resuscitations effected by means of inhalators as cases of 'victims restored to life by the Pulmotor.' Then some ill-informed community buys one of these discredited devices for its fire department."

So certain is Prof. Henderson of the value of his method that he believes it should be required by law as part of the routine management of the baby's life. Just as drops of silver nitrate must, legally, be put in the infant's eyes to save his vision from destruction by possible infection, so he should be given carbon dioxide-oxygen inhalations for a few minutes several times a day during each of the first few days of life. This measure is recommended by Prof. Henderson even for babies that start breathing promptly and normally. For those unlucky ones that fail to get started at breathing, the inhalations are the life-saving measure.

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PHYSICS

# Scale For Atom Weighing Uses Electric Lenses

THE existence of a new "scale" for weighing individual atoms that occur by the billions in a single speck of matter was revealed by Prof. A. J. Dempster, of the University of Chicago, to the American Philosophical Society, which Benjamin Franklin founded in 1727 and which is the oldest learned society in the United States.

Dr. Dempster's atom "scale" is known to science as the mass spectrograph. Although the device itself weighs several tons, it can determine the weight of individual atoms. It is used in detecting isotopes of the various kinds of matter, the varieties of a substance like chlorine or oxygen, which are chemically indistinguishable but have slightly different weights.

The new Chicago mass spectrograph is five times as sensitive as the world-famous instrument of Prof. F. W. Aston in England and fifteen times as sensitive as the similar device recently built by Dr. Kenneth Bainbridge at Princeton University.

Secret of the delicacy of the apparatus is a system of "electric lenses" which accurately focus the electrically charged atoms of the element under study as they pass through the device.

These ions, as science calls them, have to pass through a narrow slit only one thousandth of an inch wide as they enter the "scale." After curving under the action of a magnetic field, the ions strike a photographic film and register their positions. Different weight ions fall at critically characteristic positions on the film. The measurements which establish their relative weights are based on a highly accurate determination of the position of the lines. The ideal situation would be to have the lines sharp and clear, but in past instruments the lines were always wider than the entrance slit used because the ion beam was gradually spreading out like the rays from a searchlight.

The "electric lenses" in Dr. Dempster's new instrument focus the various beams of different weight ions into extremely sharp lines on the film after first letting them spread out into their magnetic "weight" pattern.

Using a new source of ions in conjunction with this new instrument, Dr. Dempster has just "weighed," for the first time in the history of science, the isotopes of gold and platinum in the pure state. The new source of ions is a highly intense electric spark which knocks out atoms from the element being studied and at the same time strips an electron from many of them, and hence gives them the needed electric charge.

Previously the only way the "noble" metals like gold and platinum could be studied was to form some gaseous compound of them which could be ionized by irradiating it with X-rays or radium rays.

Isotopes of eighteen elements have been studied so far with the new apparatus, Dr. Dempster said.

*Science News Letter, May 4, 1935*

PHYSICS

## Earth Has Magnetic Storm; No Effects on Wireless

A MAGNETIC storm, consisting of rapid and irregular oscillations in the earth's magnetic field, was reported by the U. S. Coast and Geodetic Survey observatory at Cheltenham, Md., on Thursday, April 11. Although such "storms" have nothing to do with the storms of ordinary weather, they frequently disrupt telegraph and wireless communication. The wire and radio companies, however, reported no interference.

*Science News Letter, May 4, 1935*

The rare plant, *Tunboa,* of South West Africa, grows just two leaves, but these may become ten feet long.

EVOLUTION

## NATURE RAMBLINGS
*by Frank Thone*

**Non-Survival of the Fattest**

ISN'T IT odd, how animals reach their largest size just before they vanish from the earth!

Time after time, in the course of evolutionary history, the story has repeated itself. A group of animals start off, small and unassertive. It gets along all right, for several geologic periods, gradually growing larger and larger. Finally it winds up in a veritable orgy of giantism —and then becomes extinct.

The dinosaurs and their other reptilian relatives of geology's Middle Ages started out in life modestly enough. For quite a few millions of years there were no saurians bigger than Shetland ponies. The breed must have been well adapted to life conditions as they then existed on the earth, for it prospered, gradually becoming bigger. At last we had monstrosities nearly as high as a house, and stretching their almost interminable necks and tails out to overall lengths of from seventy to ninety feet. Others went in for all sorts of fancy frills in the way of horns, bony collars and body spines. Very great gentlemen indeed they became. Then they died.

The same sort of thing happened to the titanotheres, great mammals that put in their first appearance some 75,000,000 years after the last of the dinosaurs had vanished. Their earliest genera were about the size of big dogs. Their development was steadily in the direction of greater bulk and more elaborate horns on their noses. The last titanotheres stood eight feet high at the shoulders, and had four horns apiece. Then they died.

While the titanotheres were running through their drama, a line of fairly close relatives, the rhinoceroses, were also developing. The biggest rhinoceros that ever lived, so far as we know, was Baluchitherium, who lived in Baluchistan, stood seventeen feet nine inches high at the shoulders, and had very little sense. He died, survived by smaller rhinoceroses whose last dwindling herds are now jealously conserved by public authorities in the tropics, lest they become wholly extinct before the present century is out.

Elephants came later, and reached their heyday either just before or during the great Ice Age. They started small, grew to be eleven-footers. These died, as did the slightly smaller elephants which existed in many species, until we now have only two kinds of elephants left on earth. These to be sure, are still large; we are only in the elephant's late afternoon, as compared with the deep twilight of the sad rhinoceros.

What does it mean? No satisfactory scientific explanation is yet forthcoming. But there does seem to be a sort of tendency on the part of many animal families to "swell up—and bust."

*Science News Letter, May 4, 1935*

CHEMISTRY

# Has New War Gas Been Found? Chemists Ask of Chemical

HAS A NEW war gas been discovered? Chemists at the recent meeting of the American Chemical Society asked themselves this question as they discussed the new chemical reported in the division of organic chemistry. This chemical has a blistering action of the skin comparable with that of the dreaded wartime mustard gas.

Known by the polysyllabic name pronounced tri-chloro-tri-ethyl-amine, the highly irritating chemical is a new liquid compound reported by Kyle Ward, Jr., chemist of the Experiment Station of the Hercules Powder Company of Wilmington, Delaware.

Containing 25 atoms in its highly complex molecule, the new substance was made synthetically for "raw material," as Mr. Ward described it in an interview, out of which still larger molecules could be made. Whether these still-bigger compounds were in the nature of a new, unannounced explosive, Mr. Ward was unwilling to state.

The intense blistering properties of the new liquid were discovered accidentally, Mr. Ward said, when localized burns appeared on the skin of chemists making it.

The liquid is not corrosive in the sense of certain fluorine compounds which cannot be made in ordinary glass chemical test tubes and beakers and must be prepared in paraffin receptacles. Routine chemical laboratory equipment suffices in manufacture of the new gas.

While Mr. Ward was unwilling to speculate on possible military uses of the blister-producing substances chemists recall that mustard gas is also a liquid and that the formula of the new substance is essentially the replacement of the sulfur atom of mustard gas by the element nitrogen.

Mr. Ward admitted that there was a marked similarity between the structure of his new liquid and that of mustard gas.

There will be speculation on the way the new substance might be used in wartime. The most commonly mentioned picture will be that of filling shells with the substance, as with mustard gas, which on explosion will spread the liquid widely in the form of tiny, microscopic droplets in a blister-making "fog." There is at present believed to be no intention to manufacture it with any military use in view.

*Science News Letter, May 4, 1935*

PHYSICS

# Ultraviolet and Sunlight Make "Radio Roof" Fluctuate

ULTRAVIOLET rays from the sun, combined with the sun's warming visible rays, suffice to explain the daily and seasonal fluctuations of the earth's "radio roof" or ionosphere and hence longer or shorter transmission of radio waves, it was indicated by an address presented before the meeting of the American Geophysical Union, by Dr. E. O. Hulburt, of the Naval Research Laboratory at Bellevue, D. C.

From earliest radio days, it has been known to physicists that the radio waves most used strike the lower side of the ionosphere and "bounce back" repeatedly. If it were not for this, they would probably be lost out into space.

The ionosphere is a great region of the atmosphere so far out that the now much-publicized stratosphere is only a stone's throw upward by comparison. The lowermost of its two strata, called the "E" layer, is about 60 miles over our heads; the upper, or "F" layer, has an altitude averaging two and a half times that distance.

That is the night position of the "F" layer. In the daytime it rises higher and higher until about noon one part of it, the "$F_2$" layer, is some 200 miles up—less in midwinter, considerably more in midsummer.

The sun obviously has a good deal to do with this behavior of the "radio roof," making it seem more like the top of a wind-billowing circus-tent than a respectable permanent roof.

Dr. Hulburt's observations and calculations have convinced him that the sun's effect is two-fold. First, the ultraviolet radiation charges the air molecules and other particles that may be present with electricity, causing them to fly apart and thus produce a general expansion. Second, the sun's warming rays have an additional expansive effect. The two together produce the "hump" which always "rides" the ionosphere directly beneath the sun.

Such a vast mountain of even the thinnest air naturally tends to smooth itself out by flowing away in all directions. The stream that flows westward against the earth's rotation, is roiled and thrown into invisible waves. The eastward stream flows smoothly and steadily. This picture, Dr. Hulburt said, fits in well with observed radio phenomena.

There are one or two radio facts that do not yet fit into the picture, and these challenge geophysicists to attempt further solutions to the problem.

*Science News Letter, May 4, 1935*

MEDICINE

## Electricity in Teeth May Lead to Cancer

ELECTRIC currents in the mouth due to fillings and dentures made of alloys of different electrical potentials have been found to cause irritation of the gums, tongue and cheek tissues and may be a contributing factor in cancer and other malignant diseases of the mouth.

Galvanism of the mouth, as this trouble is known, has been subjected to a clinical research study at the Harvard Dental School by Dr. Raymond J. Nagle, and almost 200 cases of suspected galvanic action have been observed.

"There is no doubt of the existence of electric action causing irritation, but the number of cases in which such a diagnosis can safely be made is very small," according to Dr. Nagle.

In most of the cases investigated, general systemic disorders of one sort or another have been present, so that it was impossible to accept galvanic action definitely as the cause of the irritation observed.

He succeeded in eliminating these other factors in five cases, however, and these responded significantly to the treatment recommended for galvanism. This consists of removing all fillings, crowns, plates and bridges from the patient's mouth and replacing them by materials that will cause no electric action. Gold which has been prepared under uniform conditions from a single casting is used in this replacement.

"Very little definite information regarding galvanic action is available, although dental literature contains many articles on the subject," Dr. Nagle said. "Our studies indicate that while galvanic action does exist, possibly in every mouth, most persons are not susceptible to any irritation from it."

"This leads us to believe that an unknown factor rather than the electric current itself produces the irritation in the few persons for whom a diagnosis of galvanism is reasonable. It appears that probably more cases are believed to be suffering from galvanic irritation than actually are affected by it."

*Science News Letter, May 4, 1935*

BOTANY

## 75-Year-Old Yucca Blossoms Again

BLOSSOMING after many years of mere vegetative existence, a yucca plant in the Missouri Botanical Garden has roused considerable comment among botanists at St. Louis, Mo. Most plants of this type do not reach a fraction of this age.

A memorial tablet, shaped like an old-fashioned tombstone stands behind the plant with the inscription: "YUCCA angustifolia, planted 1869 by the lamented Charles A. Pope, placed here in memoriam, by H. S." H. S. was the late Henry Shaw, founder of the Garden.

Now the botanists are speculating whether marble tablet and venerable plant will survive to reach the century mark, 25 years hence.

*Science News Letter, May 4, 1935*

# •First Glances at New Books

**Astronomy**

STARS AND PLANETS—Donald H. Menzel—*University Society,* 121 p., $1. cloth, 65c. paper. A compact, well-arranged general treatise on astronomy, for the more serious-minded popular audience.

*Science News Letter, May 4, 1935*

**Social Psychology**

LEADERS AND LEADERSHIP—Emory S. Bogardus—*Appleton,* 325 p., $3. "Never was the world in such sore need of superior leadership as today," is the closing thought of this text. A short cut to developing leaders seems in no imminent prospect, judging from the complex factors that work for or against leadership traits. Prof. Bogardus has furthered applied psychology, however, by presenting facts and theories, pointing out reading references, and listing provocative problem questions.

*Science News Letter, May 4, 1935*

**Zoology**

DIRECTIONS FOR THE DISSECTION OF THE CAT—Robert Payne Bigelow—*Macmillan,* 65 p., 90c. Revised edition of a standard laboratory handbook.

*Science News Letter, May 4, 1935*

**General Science**

PROCEEDINGS OF THE UTAH ACADEMY OF SCIENCES, ARTS AND LETTERS, VOL. XI, 1934—*Published by The Academy,* 300 p., $3.00.

*Science News Letter, May 4, 1935*

**Horticulture**

THE PINEAPPLE—Maxwell O. Johnson—*Paradise of the Pacific Press, Honolulu, Hawaii,* 306 p., $5. A complete horticultural treatise on the pineapple, its varieties, growing and marketing methods, parasites, diseases and pests and what to do about them.

*Science News Letter, May 4, 1935*

**Geology**

EXPOSES DE GÉOLOGIE—VOL. I.—LES PROBLÈMES DE LA RADIOGÉOLOGIE — W. Vernadsky — *Hermann et Cie., Paris,* 66 p., 15 fr.

*Science News Letter, May 4, 1935*

**Radio**

RADIO AND EDUCATION, 1934—National Advisory Council on Radio in Education—*University of Chicago Press,* 266 p., $3. Proceedings of the Fourth Annual Assembly of the council, containing contributions by Robert A. Millikan, Robert M. Hutchins, William F. Ogburn, Frederick P. Keppel, Robert G. Sproul, Alfred N. Goldsmith, Grace Abbot, John H. Finley, Harold L. Ickes, Bruce Bliven, E. H. Harris, Walter Damrosch, John Erskine, etc. It is a sort of annual survey of the brainier aspect of broadcasting.

*Science News Letter, May 4, 1935*

**Bibliography**

BIBLIOGRAPHY OF AERONAUTICS, 1931—National Advisory Committee for Aeronautics—*Gov't Print. Off.,* 50c. Continuation of annual bibliography begun in 1909.

*Science News Letter, May 4, 1935*

**General Science**

SCIENCE GUIDE FOR ELEMENTARY SCHOOLS—*California State Dept. of Education,* yearly subscription $1.25; single copies, 15c. A new journal designed especially for the assistance of California teachers, but containing much matter that could be used to advantage in other parts of the country. Individual numbers cover such subjects as Pets and Their Care, Common Insects, Weather, Sky Study, etc.

*Science News Letter, May 4, 1935*

**Helminthology**

PROCEEDINGS OF THE HELMINTHOLOGICAL SOCIETY OF WASHINGTON—*Helminthological Soc. of Washington,* semiannual, $1 a volume, foreign $1.25. Published first in mimeographed form, this journal is now issued in print. It contains articles of special value to students of worms. A feature of the present issue is a key to the genera of free-living nemas, developed by the late N. A. Cobb.

*Science News Letter, May 4, 1935*

**Psychology**

LEARNING TO BE LIKABLE—Garry C. Myers — *School and College Service,* 128 p., 40c. Practical hints addressed to the young school boy and girl by the head of the department of parent education, Cleveland College, Western Reserve University.

*Science News Letter, May 4, 1935*

**Meteorology**

WHY THE WEATHER — Charles F. Brooks—*Harcourt, Brace,* 295 p., $2.50. A revised and enlarged edition of Prof. Brooks' well-known book, which grew originally out of a series of daily newspaper articles that have been syndicated by Science Service since 1923. Much new text material has been added since the first edition appeared in 1924, and the excellent full-page photographic illustrations are practically all new.

*Science News Letter, May 4, 1935*

**Mathematics**

INEQUALITIES—G. H. Hardy, J. E. Littlewood and G. Pólya—*Cambridge,* 314 p., $4.75. Out of Cambridge and Zurich, this is a comprehensive treatment of this mathematical subject.

*Science News Letter, May 4, 1935*

**Social Science**

PLANNING AND CIVIC COMMENT—Dora A. Padgett, Managing Editor (Washington, D. C.), quarterly, $3 a year. This new journal is the official organ of the American Civic Association, the National Conference on City Planning and the National Conference on State Parks, combining and succeeding three journals formerly published separately.

*Science News Letter, May 4, 1935*

**Physics**

AN INTRODUCTORY COURSE IN COLLEGE PHYSICS—Newton Henry Black—*Macmillan,* 714 p., $3.50. Written by an assistant professor of physics at Harvard University and Radcliffe College for those college students who have never studied physics or who find that their preparation is inadequate for the more advanced textbooks. Illustrations are unusually clean and adequate.

*Science News Letter, May 4, 1935*

**Chemistry**

QUANTITATIVE CHEMICAL ANALYSIS—Alfred Stock and Arthur Stähler, Trans. by Winton Patnode and L. M. Dennis—*McGraw-Hill,* 176 p., $1.15. A laboratory manual translated from the fourth German edition.

*Science News Letter, May 4, 1935*